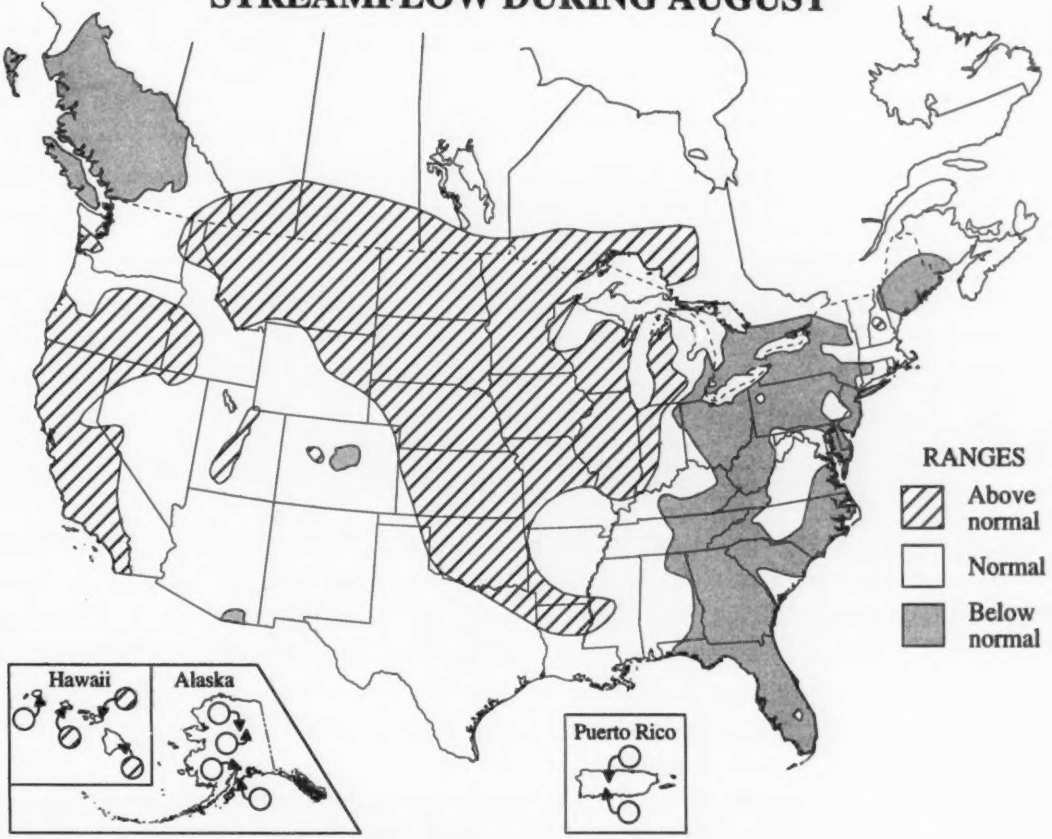
National Water Conditions

UNITED STATES
Department of the Interior
Geological Survey

CANADA
Department of the Environment
Water Resources Branch

AUGUST 1993

STREAMFLOW DURING AUGUST



Flooding abated during August throughout most of the flood-affected areas of the Midwest although stages were above flood stage in the Mississippi River from St. Louis, Missouri, downstream. Streamflow generally decreased seasonally in areas north of the Ohio River and west of the Mississippi River, but remained in the above-normal range in much of the Midwest.

Monthly mean flows were highest of record for August 1993 at 15 streamflow index stations (12 in the Midwest), including Cedar River at Cedar Rapids, Iowa, where the monthly mean was an all-time high in 90 years of record. The combined flow of the three largest rivers in the lower 48 States—the Mississippi, St. Lawrence, and Columbia Rivers—was at a record high for August.

Contents of the index reservoirs at monthend were in the below-average range at 17 of the 100 reporting sites, compared with 31 of 100 in August 1992. Contents were in the above-average range at 45 reservoirs, including most reservoirs in Quebec, South Carolina, Oklahoma, Arizona, and California,

Mean August elevations at the four master gages on the Great Lakes (provisional National Ocean Service data) were above median, but within the normal range. The elevation of Lake Ontario was slightly below the long-term average for the month.

CONTENTS

SURFACE-WATER CONDITIONS DURING AUGUST 1993

Flooding abated during August throughout most of the flood-affected areas of the Midwest although stages were still above flood stage in the Mississippi River from St. Louis, Missouri, downstream. Streamflow generally decreased seasonally in areas north of the Ohio River and west of the Mississippi River, but remained in the above-normal range in large areas of the Midwest.

Monthly mean flows at index sites in Iowa, Minnesota, North Dakota, Illinois, Missouri, Mississippi, and Oregon were highest of record for August. Streamflow also decreased in the eastern quarter of the United States, but monthly mean flows were generally in the below-normal range. Monthly mean flows were lowest of record for August in parts of Florida and New York.

The highest peak gage-height and discharge since 1844 occurred during August on the Mississippi River at St. Louis, Missouri. The peak stage was 49.58 feet and the discharge was 1,080,000 cubic feet per second (cfs) on August 1. Downstream at Vicksburg, Mississippi, the monthly mean flow of 1,027,000 cfs and the daily mean flow of 1,100,000 cfs on August 11 were highest of record for August in 64 years of record.

The combined flow of the three largest rivers in the lower 48 States—the Mississippi, St. Lawrence, and Columbia Rivers—continued above average for the 13th consecutive month and was highest of record for August in 64 years of record (hydrographs on page 5). Fifteen new maximums and two new minimums occurred during August. Hydrographs for seven of the streamflow stations where new extremes occurred are on page 4.

Hurricane Emily moved northward along the Outer Banks of North Carolina on August 31, causing considerable damage to beachfront development. Severe flooding was confined to

Provisional data; subject to revision

NEW EXTREMES DURING AUGUST 1993 AT STREAMFLOW INDEX STATIONS

Station number	Stream and place of determination	Drainage area (square miles)	Previous August extremes (period of record): Years of record	Previous August extremes: Monthly mean in cfs (year)	Previous August extremes: Daily mean in cfs (year)	August 1993: Monthly mean in cfs	August 1993: Percent of median	August 1993: Daily mean in cfs	August 1993: Day
	Low Flows								
01309500	Massapequa Creek at Massapequa, New York	38	56	1.72 (1966)	1.19 (1988)	1.55	26	1.19	24
02296750	Peace River at Arcadia, Florida	1,367	61	343 (1950)	75.0 (1981)	292	22	132	26
	High Flows								
05062000	Buffalo River near Dilworth, Minnesota	1,040	61	710 (1944)	1,040 (1955)	992	3,920	2,660	1
05082500	Red River of the North at Grand Forks, North Dakota	30,100	110	6,640 (1997)	11,200 (1985)	17,100	1,159	26,200	1
05280000	Crow River at Rockford, Minnesota	2,520	67	2,511 (1957)	3,660 (1972)	2,765	1,166	3,280	1
05330000	Minnesota River near Jordan, Minnesota	16,200	58	13,910 (1979)	27,200 (1979)	25,730	1,730	36,600	21
05331000	Mississippi River at St. Paul, Minnesota	36,800	100	33,380 (1953)	46,200 (1953)	41,590	568	51,900	22
05435500	Pecatonica River at Freeport, Illinois	1,326	78	2,036 (1924)	5,280 (1942)	2,441	359	3,360	1
05446500	Rock River near Joslin, Illinois	9,549	53	9,873 (1987)	23,500 (1972)	12,230	310	16,100	1
05464500	Cedar River at Cedar Rapids, Iowa	6,510	90	17,520 (1890)	44,500 (1890)	[1]28,410	1,165	55,200	21
05474500	Mississippi River at Keokuk, Iowa	119,000	114	112,800 (1972)	160,000 (1924)	223,000	455	281,000	1
05480500	Des Moines River at Fort Dodge, Iowa	4,190	60	8,788 (1979)	22,000 (1979)	9,244	1,553	17,200	17
05940100	Qu'Appelle River at Lumsden, Saskatchwan, Canada	6,780	36	261 (1981)	... ...	540	805	1,222	18
06810000	Nishnabotna River above Hamburg, Iowa	2,806	65	4,344 (1987)	21,100 (1987)	6,575	860	15,000	31
06934500	Missouri River at Hermann, Missouri	524,200	95	242,000 (1915)	329,000 (1958)	303,800	489	[1]739,000	1
07289000	Mississippi River at Vicksburg, Mississippi	1,140,500	65	848,710 (1958)	1,090,000 (1951)	1,027,000	292	1,100,000	11
14321000	Umpqua River near Elkton, Oregon	3,683	87	1,867 (1976)	3,810 (1947)	1,997	182	3,640	22

[1]All-time high

the southern end of Hatteras Island where the storm surge flooded some parts of the island to depths exceeding 6 feet.

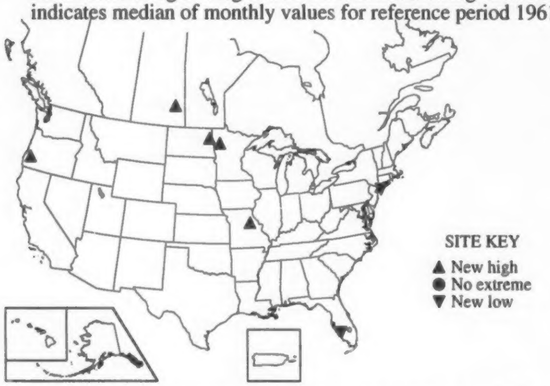
Two major rainstorms that occurred on July 15 and July 22 produced record peaks on streams discharging into Devils Lake in North Dakota with unprecedented unit runoff, especially in the Edmore Coulee basin. By the end of August, Devils Lake had risen about 3 feet since mid-July and was about 2 1/2 feet lower than the maximum elevation in this century (1,428.89 feet reached on August 2, 1987).

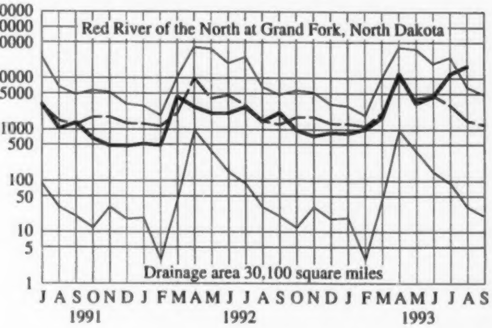
Contents of index reservoirs at monthend were in the below-average range (below the monthend average for the period of record by more than 5 percent of normal maximum contents) at 17 of 100 reporting sites compared with 19 of 100 in July and 31 of 100 sites at the end of August 1992. Contents were in the above-average range at 45 reservoirs including most reservoirs in Quebec, South Carolina, Oklahoma, Arizona, and California.

Mean August elevations at the four master gages on the Great Lakes (National Ocean Service provisional data) were in the normal range and above median. Levels fell from those of July on Lakes Ontario, Huron, and Erie and rose from those of July on Lake Superior.

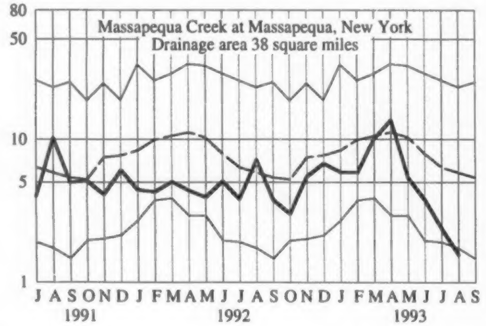
MONTHLY MEAN DISCHARGE OF SELECTED STREAMS

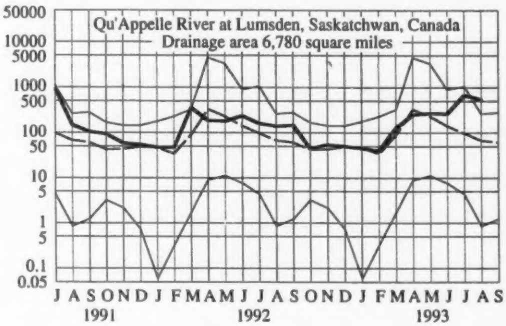
Area between light-weight solid lines indicates range between highest and lowest record for the month. Dashed line indicates median of monthly values for reference period 1961-90. Heavy line indicates mean for current period.

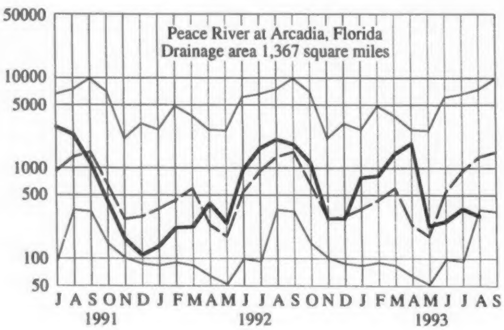


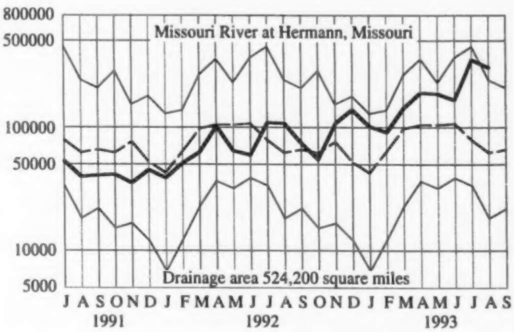


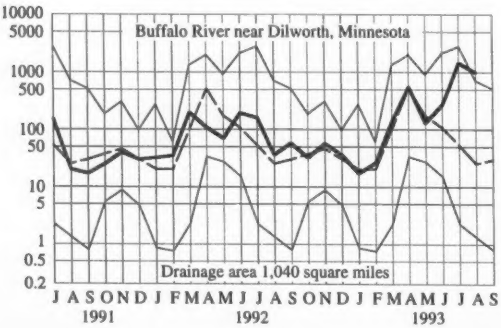
DISCHARGE, IN CUBIC FEET PER SECOND

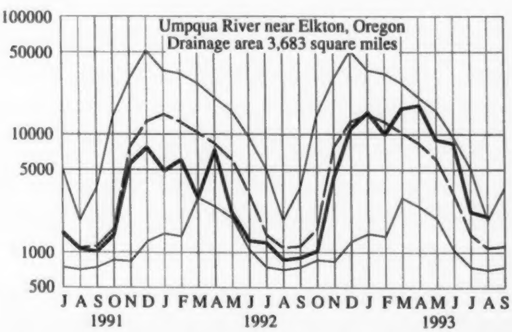






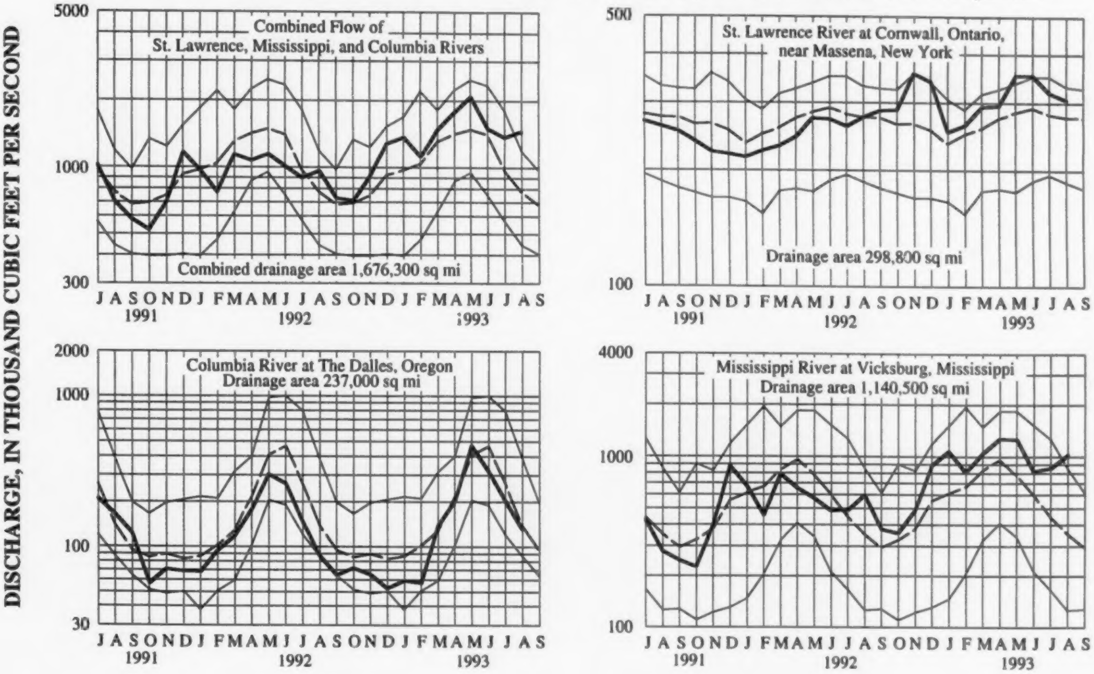






HYDROGRAPHS FOR THE "BIG THREE" RIVERS

Area between light-weight solid lines indicates range between highest and lowest record for the month. Dashed line indicates median of monthly values for reference period 1961-90. Heavy line indicates mean for current period.



Provisional data; subject to revision

DISSOLVED SOLIDS AND WATER TEMPERATURES FOR AUGUST 1993 AT DOWNSTREAM SITES ON THREE LARGE RIVERS

Station number	Station name	August data of following calendar years	Stream discharge during month Mean (ft3/s)	Dissolved-solids concentration [1] Minimum (mg/L)	Dissolved-solids concentration [1] Maximum (mg/L)	Dissolved-solids discharge [1] Mean (tons per day)	Dissolved-solids discharge [1] Minimum (tons per day)	Dissolved-solids discharge [1] Maximum (tons per day)	Water temperature [2] Mean (°C)	Water temperature [2] Minimum (°C)	Water temperature [2] Maximum (°C)
01463500	Delaware River at Trenton,	1993	3,718	105	137	1,234	939	3,279	26.5	26.5	29.0
	New Jersey, (Morrisville,	1945-92	5,978	67	158	[3]1,686	505	21,500	[3]25.0	17.5	30.5
	Pennsylvania)	(Extreme yr)		(1945)	(1967)		(1965)	(1955)			
			[4]4,787								
07289000	Mississippi River at	1993	1,027,000	220	257	667,200	595,200	714,500	28.0	27.0	29.5
	Vicksburg, Mississippi	1976-92	371,100	200	345	245,400	114,000	442,000	25.5	26.0	34.0
		(Extreme yr)		(1980)	(1986)		(1988)	(1979)			
			[4]351,200								
06934500	Missouri River at Hermann,	1993	303,800	256	313	227,600	134,000	535,000	28.0	24.0	30.0
	Missouri. (60 miles west of	1976-92	69,870	218	535	72,060	43,000	180,000	26.5	22.0	31.0
	St. Louis, Missouri)	(Extreme yr)		(1981)	(1979)		(1977)	(1982)			
			[4]62,040								

[1]Dissolved-solids concentrations, when not analyzed directly, are calculated on basis of measurements of specific conductance.
[2]To convert °C to °F: [(1.8 x °C) + 32] = °F.
[3]Mean for 8-year period (1983-91).
[4]Median of monthly values for 30-year reference period, water years 1961-90, for comparison with data for current month.

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FLOW OF LARGE RIVERS DURING AUGUST 1993

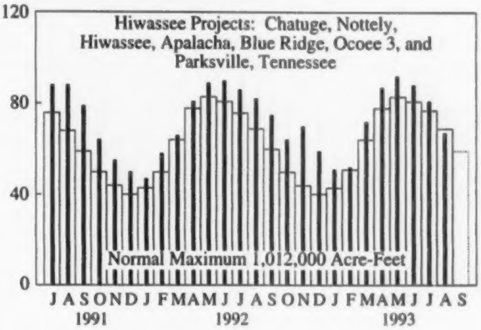
Station number	Stream and place of determination	Drainage area (square miles)	Average discharge through September 1991 (cubic feet per second)	August 1993					
				Monthly mean discharge (cubic feet per second)	Percent of median monthly discharge 1961–90	Change in discharge from previous month (percent)	Discharge near end of month		
							Cubic feet per second	Million gallons per day	Date
01014000	St. John River below Fish River at Fort Kent, Maine	5,665	9,693	3,793	93	–4	2,860	1,850	31
01318500	Hudson River at Hadley, New York	1,664	2,925	† 616	57	–9	580	374	31
01357500	Mohawk River at Cohoes, New York	3,456	5,673	1,420	96	12	980	633	31
01463500	Delaware River at Trenton, New Jersey	6,780	11,660	3,718	78	6	2,880	1,860	31
01570500	Susquehanna River at Harrisburg, Pennsylvania	24,100	34,200	† 5,747	64	–9	4,560	2,950	31
01646500	Potomac River near Washington, District of Columbia	11,560	[1]11,070	[1]2,570	77	–16	...	...	...
02105500	Cape Fear River at William O. Huske Lock, near Tarheel, North Carolina.	4,852	4,933	...	...	...	...	...	...
02131000	Pee Dee River at Peedee, South Carolina	8,830	9,903	† 3,778	58	–6	2,030	1,310	31
02226000	Altamaha River at Doctortown, Georgia	13,600	13,570	† 2,805	42	–23	2,400	1,550	31
02320500	Suwannee River at Branford, Florida	7,880	7,038	† 2,459	47	–20	2,380	1,540	31
02358000	Apalachicola River at Chattahoochee, Florida	17,200	22,137	† 11,340	82	–6	6,960	4,500	31
02467000	Tombigbee River at Demopolis lock and dam, near Coatopa, Alabama.	15,385	23,700	7,013	133	35	1,550	1,000	31
02489500	Pearl River near Bogalusa, Louisiana	6,573	10,102	3,995	145	–60	2,660	1,720	31
03049500	Allegheny River at Natrona, Pennsylvania	11,410	[1]19,690	† [1]3,870	64	6	2,460	1,590	31
03085000	Monongahela River at Braddock, Pennsylvania	7,337	[1]12,540	† [1]1,960	49	–12	1,850	1,200	31
03193000	Kanawha River at Kanawha Falls, West Virginia	8,367	12,550	† 2,972	57	–20	3,380	2,180	30
03234500	Scioto River at Higby, Ohio	5,131	4,654	† 728	62	–90	466	301	31
03294500	Ohio River at Louisville, Kentucky[2]	91,170	115,900	32,900	90	–46	19,400	12,500	31
03377500	Wabash River at Mount Carmel, Illinois	28,635	27,880	* 20,300	207	–52	13,000	8,400	31
04084500	Fox River at Rapide Croche Dam, near Wrightstown, Wisconsin.[2]	6,010	4,248	* 7,220	337	–54	3,870	2,500	31
04264331	St. Lawrence River at Cornwall, Ontario, near Massena, New York.[3]	298,800	245,300	* 305,000	111	–4	293,000	189,000	31
02NG001	St. Maurice River at Grand Mere, Quebec	16,300	[1]24,290	...	...	...	...	...	...
05082500	Red River of the North at Grand Forks, North Dakota	30,100	2,565	17,100	1,159	40	6,550	4,230	31
05133500	Rainy River at Manitou Rapids, Minnesota	19,400	9,036	* 26,450	262	18	16,000	10,300	31
05330000	Minnesota River near Jordan, Minnesota	16,200	7,062	* 25,730	1,730	–31	21,000	13,600	31
05331000	Mississippi River at St. Paul, Minnesota	36,800	[1]15,890	* 41,590	568	–39	37,400	24,200	31
05365500	Chippewa River at Chippewa Falls, Wisconsin	5,650	5,072	2,900	103	–43	3,200	2,070	30
05407000	Wisconsin River at Muscoda, Wisconsin	10,400	8,666	* 9,100	170	–42	7,780	5,030	31
05446500	Rock River near Joslin, Illinois	9,549	6,161	* 12,230	311	–50	10,600	6,850	31
05474500	Mississippi River at Keokuk, Iowa	119,000	64,070	* 223,000	455	–44	214,000	138,000	31
06214500	Yellowstone River at Billings, Montana	11,795	6,965	* 8,024	147	–48	5,140	3,320	31
06934500	Missouri River at Hermann, Missouri	524,200	76,940	* 303,800	490	–14	160,000	103,000	31
07289000	Mississippi River at Vicksburg, Mississippi[4]	1,140,500	583,000	* 1,027,000	292	19	910,000	588,000	30
07331000	Washita River near Dickson, Oklahoma	7,202	1,584	* 597	186	–67	683	441	31
08276500	Rio Grande below Taos Junction Bridge, near Taos, New Mexico.	9,730	757	443	124	–39	670	433	31
09315000	Green River at Green River, Utah	44,850	6,292	2,375	73	–54	...	...	...
11425500	Sacramento River at Verona, California	21,251	18,810	* 19,040	152	21	...	...	...
13269000	Snake River at Weiser, Idaho	69,200	18,220	* 12,400	115	3	10,500	6,790	31
13317000	Salmon River at White Bird, Idaho	13,550	11,160	7,240	131	–47	5,600	3,620	31
13342500	Clearwater River at Spalding, Idaho	9,570	15,290	4,760	122	–63	3,500	2,260	31
14105700	Columbia River at The Dalles, Oregon[5]	237,000	[1]192,200	[1]132,200	96	–35	90,400	58,400	30
14191000	Willamette River at Salem, Oregon	7,280	[1]23,400	[1]4,856	116	–41	8,730	5,640	30
15515500	Tanana River at Nenana, Alaska	25,600	24,200	57,200	103	–9	40,000	26,000	31
08MF005	Fraser River at Hope, British Columbia	83,800	95,720	103,500	83	–20	89,300	57,700	31

[1]Adjusted.
[2]Records furnished by Corps of Engineers.
[3]Records furnished by Buffalo District, Corps of Engineers, through International St. Lawrence River Board of Control. Discharges shown are considered to be the same as discharge at Ogdensburg, N.Y., when adjusted for storage in Lake St. Lawrence.
[4]Records of daily discharge computed jointly by Corps of Engineers and Geological Survey.
[5]Discharge determined from information furnished by Bureau of Reclamation, Corps of Engineers, and Geological Survey.

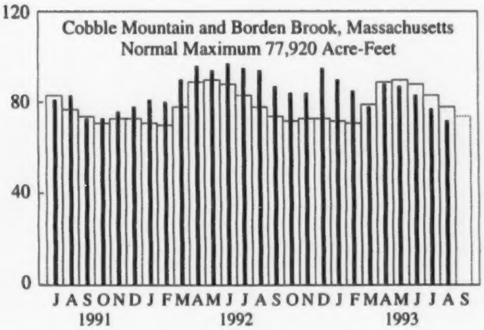
* Above–normal range
† Below–normal range

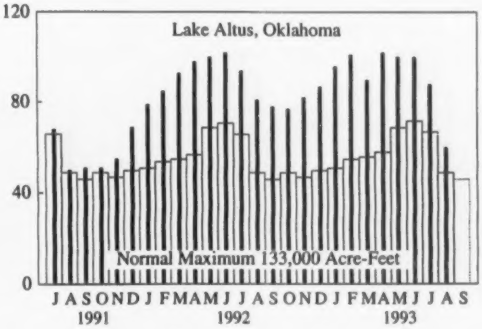
USABLE CONTENTS OF SELECTED RESERVOIRS NEAR END OF AUGUST 1993

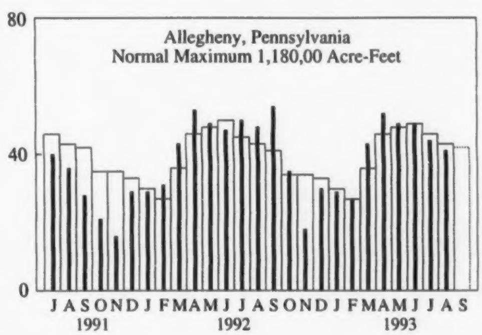
[Contents are expressed in percent of reservoir (system) capacity. The usable capacity of each reservoir (system) is shown in the column headed "Normal maximum" in the table Usable contents of selected reservoir systems.]

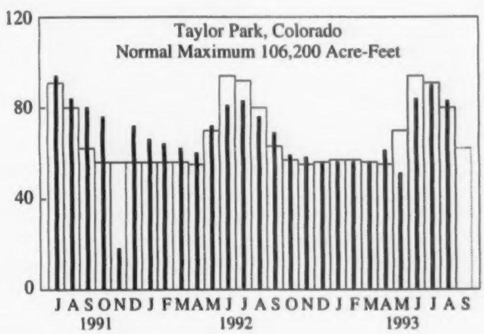


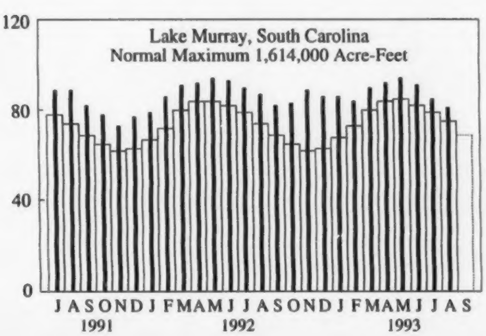
PERCENT OF NORMAL MAXIMUM

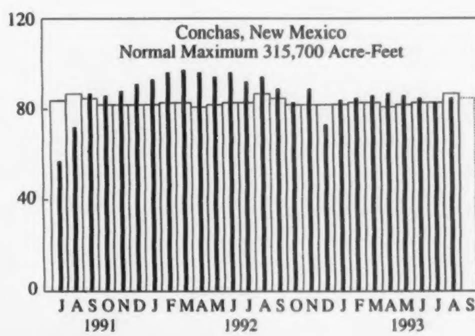












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USABLE CONTENTS OF SELECTED RESERVOIRS AND RESERVOIR SYSTEMS NEAR END OF AUGUST 1993

[Contents are expressed in percent of reservoir or reservoir system capacity. The usable capacity of reservoir or reservoir system is shown in the column headed "Normal maximum"]

Reservoir or reservoir system Principal uses: F-Flood control I-Irrigation M-Municipal P-Power R-Recreation W-Industrial	Percent of normal maximum: End of August 1993	Percent of normal maximum: End of August 1992	Percent of normal maximum: Average for end of August	Percent of normal maximum: End of July 1993	Normal maximum (acre-feet)[1]
NOVA SCOTIA					
Rossignol, Mulgrave, Falls Lake, St. Margaret's Bay, Black, and Ponhook reservoirs (P)	† 41	32	49	54	[2]226,300
QUEBEC					
Allard (P)	* 87	85	69	84	280,600
Gouin (P)	* 88	70	69	78	6,954,000
MAINE					
Seven reservoir systems (MP)	72	77	69	84	4,146,000
NEW HAMPSHIRE					
First Connecticut Lake (P)	82	86	84	85	76,450
Lake Francis (FPR)	83	79	81	89	99,310
Lake Winnipesaukee (PR)	71	83	76	76	165,700
VERMONT					
Harriman (P)	* 78	74	71	78	116,200
Somerset (P)	77	79	75	83	57,390
MASSACHUSETTS					
Cobble Mountain and Borden Brook (MP)	† 72	94	78	77	77,920
NEW YORK					
Great Sacandaga Lake (FPR)	70	84	72	83	786,700
Indian Lake (FMP)	* 84	86	74	90	103,300
New York City reservoir system (MW)	† 63	77	81	...	1,680,000
NEW JERSEY					
Wanaque (M)	† 43	72	75	66	85,100
PENNSYLVANIA					
Allegheny (FPR)	41	48	43	44	1,180,000
Pymatuning (FMR)	87	95	88	93	188,000
Raystown Lake (FR)	67	67	64	67	761,900
Lake Wallenpaupack (PR)	67	67	65	67	157,800
MARYLAND					
Baltimore Municipal System (M)	* 95	70	87	98	261,900
NORTH CAROLINA					
Bridgewater (Lake James) (P)	93	95	89	95	288,800
Narrows (Badin Lake) (P)	93	93	97	92	128,900
High Rock Lake (P)	76	79	74	82	234,800
SOUTH CAROLINA					
Lake Murray (P)	* 81	87	75	85	1,614,000
Lake Marion and Lake Moultrie (P)	* 86	87	71	84	1,777,000
SOUTH CAROLINA-GEORGIA					
Strom Thurmond Lake (FP)	62	71	66	68	1,730,000
GEORGIA					
Burton Lake (PR)	94	98	89	92	104,000
Sinclair (MPR)	* 93	91	87	82	214,000
Lake Sidney Lanier (FMPR)	† 51	60	57	55	1,686,000
ALABAMA					
Lake Martin (P)	* 94	96	87	95	1,375,000
TENNESSEE VALLEY					
Clinch Projects: Norris and Melton Hill Lakes (FPR)	* 53	57	47	63	2,293,000
Douglas Lake (FPR)	49	73	47	71	1,395,000
Hiwassee Projects: Chatuge, Nottely, Hiwassee, Apalachia, Blue Ridge, Ocoee 3, and Parksville Lakes (FPR)	67	82	69	81	1,012,000
Holston Projects: South Holston, Watauga, Boone, Fort Patrick Henry, and Cherokee Lakes (FPR)	60	70	55	72	2,880,000
Little Tennessee Projects: Nantahala, Thorpe, Fontana, and Chilhowee Lakes (FPR)	* 73	86	67	85	1,478,000
WISCONSIN					
Chippewa and Flambeau (PR)	82	78	77	88	365,000
Wisconsin River (21 reservoirs) (PR)	* 71	57	64	84	399,000
MINNESOTA					
Mississippi River Headwater System (FMR)	* 48	40	35	52	1,640,000
NORTH DAKOTA					
Lake Sakakawea (Garrison) (FIPR)	† 80	62	88	79	22,700,000
SOUTH DAKOTA					
Angostura (I)	* 88	61	71	91	130,770
Belle Fourche (I)	* 69	7	37	82	185,200
Lake Francis Case (FIP)	85	86	81	90	4,589,000
Lake Oahe (FIP)	* 89	64	68	85	22,240,000
Lake Sharpe (FIP)	100	103	101	102	1,697,000
Lewis and Clark Lake (FIP)	† 91	92	103	92	432,000
NEBRASKA					
Lake McConaughy (IP)	66	49	67	65	1,948,000
OKLAHOMA					
Eufaula Lake (FPR)	* 98	103	85	103	2,378,000
Keystone Lake (FPR)	* 101	106	88	134	661,000
Tenkiller Ferry Lake (FPR)	* 104	110	93	110	628,200
Lake Altus (FIMR)	* 60	81	49	88	133,000
Lake O'The Cherokees (FPR)	* 98	96	85	101	1,492,000
OKLAHOMA-TEXAS					
Lake Texoma (FMPRW)	94	95	91	102	2,722,000
TEXAS					
Bridgeport (IMW)	* 88	95	53	95	386,400
Canyon Lake (FMR)	* 96	97	81	98	385,600
International Amistad (FIMPW)	86	97	82	87	3,497,000
International Falcon (FIMPW)	65	101	64	74	2,668,000
Livingston (IMW)	* 96	99	90	101	1,788,000
Possum Kingdom Lake (IMPRW)	† 82	93	96	86	570,200
Red Bluff (P)	* 32	48	25	37	307,000
Toledo Bend (P)	85	95	86	92	4,472,000
Twin Buttes (FIM)	* 56	78	33	64	177,800
Lake Kemp (IMW)	84	88	83	92	268,000
Lake Meredith (FMW)	36	43	39	37	796,900
Lake Travis (FIMPRW)	* 83	93	77	91	1,144,000
MONTANA					
Canyon Ferry Lake (FIMPR)	* 94	73	85	96	2,043,000
Fort Peck Lake (FPR)	† 71	57	87	68	18,910,000
Hungry Horse (FIPR)	† 71	65	93	69	3,451,000
WASHINGTON					
Ross (PR)	99	85	95	100	1,052,000
Franklin D. Roosevelt Lake (IP)	97	97	102	96	5,022,000
Lake Chelan (PR)	97	97	98	99	676,100
Lake Cushman (PR)	99	95	95	102	359,500
Lake Merwin (P)	100	101	103	101	245,600
IDAHO					
Boise River (4 Reservoirs) (FIP)	* 64	12	54	79	1,235,000
Coeur d'Alene Lake (P)	* 118	97	77	97	238,500
Pend Oreille Lake (FP)	99	99	99	98	1,561,000
IDAHO-WYOMING					
Upper Snake River (8 Reservoirs) (MP)	* 72	20	54	84	4,401,000
WYOMING					
Boysen (FIP)	* 95	75	86	97	802,000
Buffalo Bill (IP)	* 115	79	87	124	421,300
Keyhole (F)	† 36	10	42	36	193,800
Pathfinder, Seminoe, Alcova, Kortes, Glendo, and Guernsey reservoirs (I)	† 44	28	50	51	3,056,000
COLORADO					
John Martin (FIR)	15	5	19	17	364,400
Taylor Park (IR)	83	76	80	90	106,200
Colorado-Big Thompson Project (I)	* 75	60	64	81	730,300
COLORADO RIVER STORAGE PROJECT					
Lake Powell; Flaming Gorge, Fontenelle, Navajo, and Blue Mesa reservoirs (IFPR)	† 61	63	79	81	31,620,000
UTAH-IDAHO					
Bear Lake (IPR)	† 22	17	63	38	1,421,000
CALIFORNIA					
Folsom Lake (FIMPR)	61	21	63	76	1,000,000
Hetch Hetchy (MP)	* 96	62	70	100	360,400
Lake Isabella (FIR)	* 58	16	34	69	568,100
Pine Flat Lake (FIR)	* 58	3	38	81	1,001,000
Clair Engle Lake (Lewiston) (FP)	* 83	37	75	85	2,438,000
Lake Almanor (P)	* 90	78	61	98	1,036,000
Lake Berryessa (FIMRW)	† 50	30	75	53	1,600,000
Millerton Lake (FI)	* 49	35	43	87	503,200
Shasta Lake (FIPR)	* 80	44	67	91	4,377,000
CALIFORNIA-NEVADA					
Lake Tahoe (IMPRW)	† 4	0	59	10	744,600
NEVADA					
Rye Patch (I)	† 19	0	52	27	194,300
ARIZONA-NEVADA					
Lake Mead and Lake Mohave (FIMP)	* 81	75	75	81	27,970,000
ARIZONA					
San Carlos (IP)	* 55	59	22	61	935,100
Salt and Verde River System (IMPR)	* 67	76	45	71	2,019,100
NEW MEXICO					
Conchas (FIR)	85	94	87	83	315,700
Elephant Butte and Caballo (FIPR)	* 85	84	38	88	2,394,000

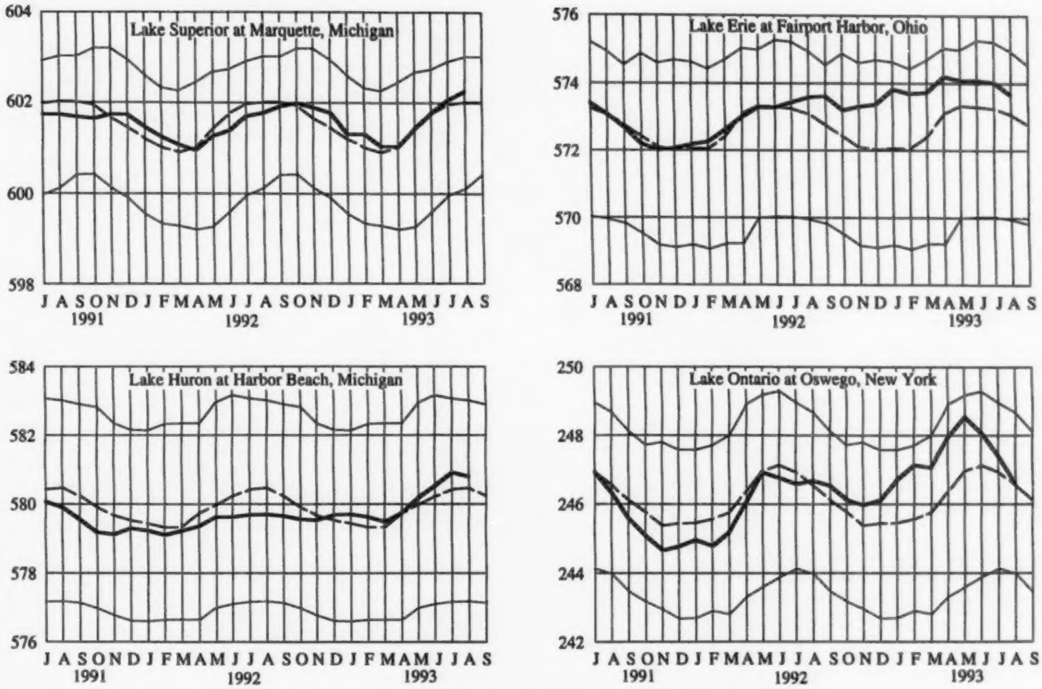
[1]1 acre-foot = 0.04356 million cubic feet = 0.326 million gallons = 0.504 cubic feet per second per day.
[2]Thousands of kilowatt-hours (the potential electric power that could be generated by the volume of water in storage).

* Above-average range
† Below-average range

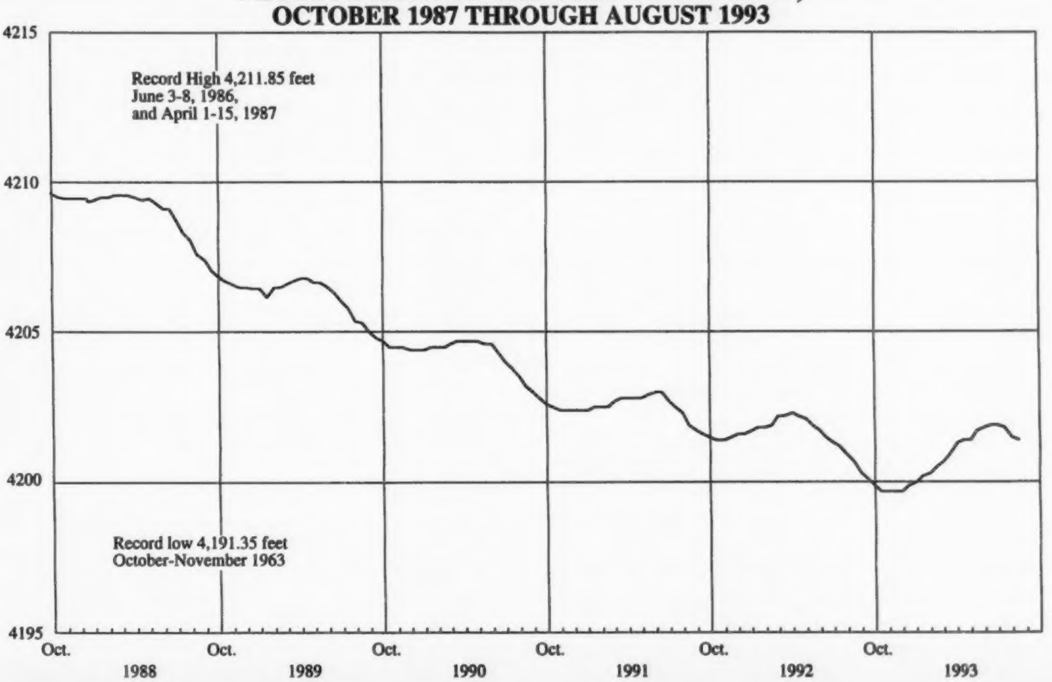
GREAT LAKES ELEVATIONS

Area between light-weight solid lines indicates range between highest and lowest record for the month. Dashed line indicates median of monthly values for reference period 1961-90. Heavy line indicates mean for current period. Data from National Ocean Service.

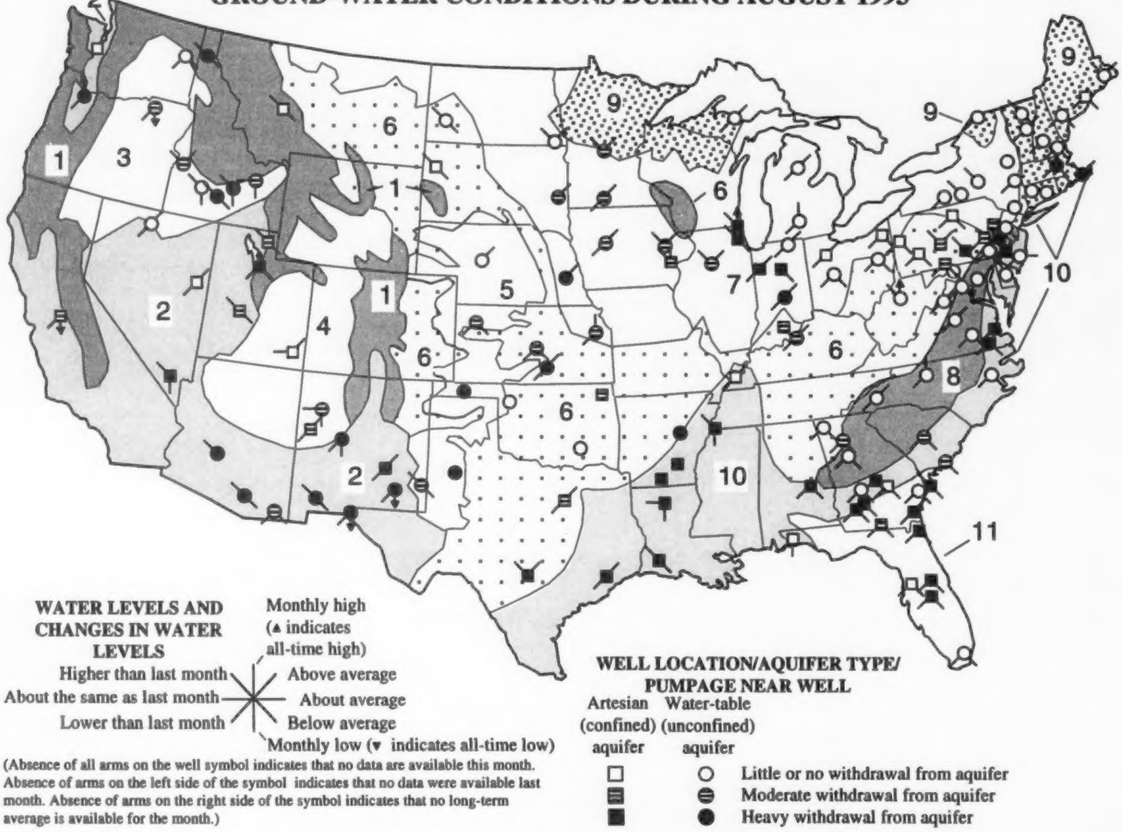
ELEVATION, IN FEET ABOVE NATIONAL GEODETIC VERTICAL DATUM OF 1929



FLUCTUATIONS OF THE GREAT SALT LAKE, OCTOBER 1987 THROUGH AUGUST 1993



GROUND-WATER CONDITIONS DURING AUGUST 1993



New extremes occurred at 23 ground-water index stations (see table on page 12) during August—16 lows (including 6 all-time, counting the equalling of an all-time low set in July) and 7 highs—compared with 33 new extremes last month. Graphs showing water levels in seven wells for the past 26 months are on page 13. Two of the graphs are for wells in the Nonglaciated Central region. The other graphs are for wells in the Alluvial Basins region (Arizona), the Columbia Lava Plateau region (tied an all-time high in Idaho), the Piedmont and Blue Ridge region (Virginia), the Atlantic and Gulf Coastal Plain region (Florida), and the Glaciated Central region (all-time high in Illinois).

Ground-water levels in the Western Mountain Ranges region were above last month's except in Washington, and below long-term average throughout the region.

In the Alluvial Basins region, ground-water levels were generally below last month's in California, Oregon, and Texas, and were mixed with respect to last month's levels in Arizona, New Mexico, Nevada, and Utah. Levels were below long-term average except in the Oregon well, which was above average, and mixed with respect to long-term average in Nevada and New Mexico. All-time lows occurred in the Mehrten aquifer well near Wilton, California (for the second consecutive month), in the Roswell Basin shallow aquifer at Dayton, New Mexico (following three monthly lows), and in the Hueco Bolson aquifer at El Paso, Texas (for the second consecutive month). Monthly lows occurred in the valley-fill aquifer well near Las Vegas, Nevada, and the basin-fill aquifer at Albuquerque, New Mexico. An August high occurred at the Troutdale aquifer well near Portland, Oregon.

In the Columbia Lava Plateau region, water levels were below last month's in Oregon and above last month's levels in Idaho. Water levels were below long-term average in Oregon and mixed with respect to long-term average in Idaho. All-time lows occurred in the Columbia River basalts aquifer well at Pendleton, Oregon (for the second consecutive month) and in the Snake River Plain aquifer well near Atomic City, Idaho (equalling an all-time low set in July). Monthly lows occurred in the Snake River Plain aquifer wells at Gooding, Idaho (for the 11th consecutive month) and near Rupert, Idaho (for the 14th consecutive month).

Ground-water levels in the Colorado Plateau and Wyoming Basin region were the same as last month's in Utah and generally below last month's levels in New Mexico. Levels were above long-term average in Utah and mixed with respect to average in New Mexico. A monthly low occurred in the Westwater Canyon aquifer well near Grants-Bluewater, New Mexico (for the eighth consecutive month).

In the High Plains region, ground-water levels were below

Provisional data; subject to revision

WATER LEVELS IN KEY OBSERVATION WELLS IN SOME REPRESENTATIVE AQUIFERS IN THE CONTERMINOUS UNITED STATES–AUGUST 1993

GROUND–WATER REGION Aquifer and Location	Aquifer type and local aquifer pumpage	Depth of well in feet	Water level in feet below land–surface datum	Departure from average in feet	Net change in water level in feet since: Last month	Net change in water level in feet since: Last year	Year records began	Remarks
WESTERN MOUNTAIN RANGES (1)								
Rathdrum Prairie aquifer near Athol, northern Idaho	●	485	465.6	-6.7	0.6	-1.9	1929	
ALLUVIAL BASINS (2)								
Alluvial valley–fill aquifer in Steptoe Valley, Nevada	□	122	10.04	2.58	-.38	-.37	1949	
Valley–fill aquifer, Elfrida area near Douglas, Arizona	⊜	124	100.48	-15.72	-.03	.64	1947	
Hueco bolson aquifer at El Paso, Texas	●	640	274.58	-19.64	-.10	-1.90	1964	All–time low
COLUMBIA LAVA PLATEAU (3)								
Snake River Plain aquifer near Eden, Idaho	●	137	122.5	-5.6	1.5	2.1	1962	
Columbia River basalts aquifer at Pendleton, Oregon	⊜	1,501	230.53	-36.62	-2.23	-3.18	1965	All–time low
COLORADO PLATEAU AND WYOMING BASIN (4)								
Dakota aquifer near Blanding, Utah	□	140	42.98	2.53	.03	4.87	1960	
HIGH PLAINS (5)								
Ogallala aquifer near Colby, Kansas	⊜	175	131.45	-10.51	-.35	-.09	1947	Aug. low
Southern High Plains aquifer at Lovington, New Mexico	⊜	212	58.30	-3.50	.16	.07	1971	
NONGLACIATED CENTRAL REGION (6)								
Sentinel Butte aquifer near Dickinson, North Dakota	○	160	19.56	-1.54	.48	2.75	1968	
Sand and gravel Pleistocene aquifer near Valley Center, Kansas	●	54	14.59	2.64	-.50	4.47	1937	
Glacial outwash aquifer near Louisville, Kentucky	⊜	94	18.07	5.87	.07	.19	1945	
Upper Pennsylvanian aquifer in the Central Appalachians Plateau near Glenville, West Virginia	○	25	10.33	6.33	.17	.45	1953	All–time high
GLACIATED CENTRAL REGION (7)								
Fluvial sand and gravel aquifer, Platte River Valley, near Ashland, Nebraska	●	12	3.02	2.93	...	2.94	1933	
Sheyenne Delta aquifer near Wyndmere, North Dakota	○	40	3.88	2.25	-1.36	1.87	1963	
Pleistocene (glacial drift) aquifer at Princeton, Illinois	⊜	29	6.24	5.68	.26	.28	1942	
Shallow drift aquifer near Roscommon, Michigan	○	14	4.60	.37	-.27	.09	1934	
Silurian–Devonian carbonate aquifer near Dola, Ohio	□	51	7.25	.86	-1.07	-.82	1954	
PIEDMONT AND BLUE RIDGE (8)								
Water–table aquifer in Petersburg Granite, southeastern Piedmont at Colonial Heights, Virginia	○	100	16.66	-.83	-.75	-1.02	1939	
Weathered granite aquifer near Mocksville, North Carolina	○	31	15.24	3.13	-.69	1.42	1981	Aug. high
Surficial aquifer at Griffin, Georgia	○	30	17.48	-1.18	-1.21	-.77	1943	
NORTHEAST AND SUPERIOR UPLANDS (9)								
Pleistocene glacial outwash aquifer, at Camp Ripley, near Little Falls, Minnesota	⊜	59	12.11	2.39	.95	2.58	1949	
Glacial outwash sand aquifer at Oxford, Maine	○	39	9.43	-.49	-.43	-.53	1980	
Shallow sand aquifer (glacial deposits) at Acton, Massachusetts	●	34	20.02	-.59	-1.04	-.22	1965	
Stratified drift aquifer near Morristown, Vermont	○	50	19.97	-.23	.11	.13	1966	
ATLANTIC AND GULF COASTAL PLAIN (10)								
Columbia deposits aquifer near Camden, Delaware	○	11	...	...	...	...	1950	
Memphis sand aquifer near Memphis, Tennessee	■	384	109.03	-16.85	.11	-.85	1940	Aug. low
Eutaw aquifer at Montgomery, Alabama	■	270	26.5	-2.2	-1.3	-1.9	1952	
Evangeline aquifer at Houston, Texas	■	1,152	277.93	24.97	-2.58	3.61	1978	
SOUTHEAST COASTAL PLAIN (11)								
Upper Floridan aquifer on Cockspur Island near Savannah, Georgia	■	348	36.97	-7.54	.19	-2.92	1956	
Upper Floridan aquifer at Jacksonville, Florida	■	905	-19.8	-8.4	-1.2	-1.6	1930	
Biscayne aquifer near Homestead, Florida	○	20	6.58	-.39	-.45	-.19	1932	

last month's in Kansas and above last months levels in New Mexico. Levels were below the long-term average except in Nebraska. An August low occurred in the Ogallala aquifer well near Colby, Kansas.

Ground-water levels in the Nonglaciated Central region were generally below last month's except in Pennsylvania and Texas where they were mixed with respect to last month's levels, and in North Dakota, South Dakota, and West Virginia where they were above last month's levels. Water levels were generally above long-term average in Texas, Kentucky, Virginia, and West Virginia, below average in Georgia, North Dakota, and South Dakota, and mixed in Kansas and Pennsylvania. An all-time high occurred in the Upper Pennsylvania aquifer well near Glenville, West Virginia (for the second consecutive month following five monthly highs).

Ground-water levels in the Glaciated Central region were above last month's in Illinois, mixed with respect to last month's levels in Iowa and New York, and generally below last month's levels elsewhere. Water levels were below long-term average only in Pennsylvania and mixed with respect to long-term average in Illinois, Indiana, and Ohio, but were above average elsewhere. A monthly low occurred in the Sandstone aquifer well

Provisional data; subject to revision

NEW EXTREMES DURING AUGUST AT GROUND–WATER INDEX STATIONS

WRD Station Identification Number	GROUND–WATER REGION Aquifer and Location	Aquifer type and local aquifer pumpage	Depth of well	End–of–month water level in feet below land surface datum: Previous August Record: Years of record	Average	Extreme (year)	August 1993
	LOW WATER LEVELS						
	ALLUVIAL BASINS (2)						
315212106245101	Hueco bolson aquifer at El Paso, Texas	●	640	28	254.94	273.00 (1991)	[1]274.58
324340104231701	Roswell Basin shallow aquifer at Dayton, New Mexico	●	250	42	93.84	123.21 (1992)	[1]123.34
351051106395301	Basin–fill aquifer at Albuquerque, New Mexico	●	980	10	35.07	39.10 (1992)	40.06
361611115151301	Valley–fill aquifer near Las Vegas, Nevada	■	905	47	39.50	114.66 (1992)	120.62
382444121123301	Mehrten aquifer near Wilton, California	▤	300	6	137.58	143.03 (1992)	[1]143.94
	COLUMBIA LAVA PLATEAU (3)						
424053113412801	Snake River Plain aquifer near Rupert, Idaho	●	194	42	153.5	166.7 (1992)	167.9
425635114382302	Snake River Plain aquifer at Gooding, Idaho	○	165	21	132.5	148.0 (1992)	148.1
432700112470801	Snake River Plain aquifer near Atomic City, Idaho	⊜	636	43	585.2	589.1 (1992)	[1]590.0
453934118491701	Columbia River basalts aquifer at Pendleton, Oregon	⊜	1,501	26	195.03	227.35 (1992)	[1]230.53
	COLORADO PLATEAU AND WYOMING BASIN (4)						
352023107473201	Westwater Canyon aquifer near Grants–Bluewater, New Mexico	⊜	155	37	75.47	78.87 (1991)	81.84
	HIGH PLAINS (5)						
392329101040201	Ogallala aquifer near Colby, Kansas	⊜	175	46	120.94	131.36 (1992)	131.45
	GLACIATED CENTRAL REGION (7)						
410940074583401	Sandstone aquifer at Pocono Mt. Lakes Estates, Pennsylvania	▤	799	12	48.69	73.97 (1991)	80.69
	ATLANTIC AND GULF COASTAL PLAIN (10)						
303108087162301	Sand and gravel aquifer at Ensley, Florida	□	239	53	73.69	83.98 (1992)	85.00
321357092341701	Sparta aquifer near Ruston, Louisiana	▤	763	49	224.89	238.36 (1992)	239.55
350900089482300	Memphis sand aquifer near Memphis, Tennessee	■	384	52	92.18	108.22 (1988)	109.03
372506076511703	Upper Potomac aquifer near Toana, Virginia	■	401	8	159.54	164.19 (1992)	[1]165.80
	HIGH WATER LEVELS						
	ALLUVIAL BASINS (2)						
452938122254801	Troutdale aquifer near Portland, Oregon	●	715	30	108.66	91.40 (1989)	88.69
	NONGLACIATED CENTRAL REGION (6)						
385604080495901	Upper Pennsylvanian aquifer near Glenville, West Virginia	○	25	39	16.66	10.78 (1992)	[2]10.33
	GLACIATED CENTRAL REGION (7)						
390006095132301	Newman terrace deposits aquifer near Lawrence, Kansas	⊜	53	41	21.16	17.57 (1969)	15.08
414315091252002	Devonian aquifer near Morse, Iowa	▤	82	51	17.28	13.71 (1990)	11.50
422803087475304	Ironton–Galesville aquifer at Illinois Beach State Park, Illinois	■	1,203	4	233.12	233.5 (1990)	[2]222.16
425410084323501	Shallow drift aquifer near Dewitt, Michigan	○	26	45	17.71	16.62 (1975)	16.15
	PIEDMONT AND BLUE RIDGE (8)						
355359080331701	Weathered granite aquifer near Mocksville, North Carolina	○	31	11	18.37	15.79 (1991)	15.24

[1] All–time month–end low. [2] All–time month–end high.

at Pocono Mountain Lakes Estates, Pennsylvania. An all-time high occurred in the Ironton-Galesville aquifer well at Illinois Beach State Park, Illinois (the ninth consecutive all-time high). Monthly highs occurred in the Devonian aquifer well near Morse, Iowa (for the third consecutive month), the Newman Terrace deposits aquifer well near Lawrence, Kansas (for the third consecutive month), and the shallow drift aquifer well near Dewitt, Michigan (for the second consecutive month).

In the Piedmont and Blue Ridge region, ground-water levels were below last month's throughout the region. Levels were below long-term average in Georgia and New Jersey, generally above long-term average in North Carolina, and mixed with respect to average in Pennsylvania and Virginia. A monthly high occurred in the Weathered granite aquifer well near Mocksville, North Carolina (for the 10th consecutive time).

In the Northeast and Superior Uplands region, levels were generally above last month's in Minnesota and below last month's levels elsewhere, except in Maine and Vermont where levels were mixed. Water levels were above average in Michigan and Minnesota, below average in Massachusetts and New Hampshire, and mixed with respect to average in Maine and Vermont.

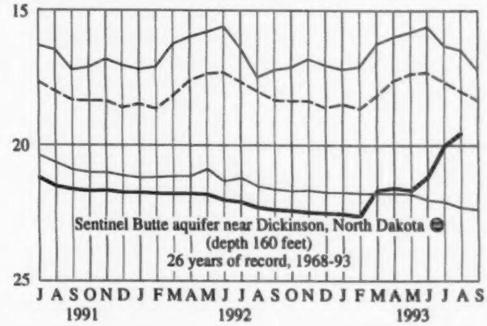
In the Atlantic and Gulf Coastal Plain region, water levels were below last month's except in Virginia and New Jersey where levels were mixed with respect to last month's, and above last month's in Tennessee, Texas, and Louisiana. Levels were above long-term average in Florida, Texas, Massachusetts, and Kentucky and below average elsewhere. All-time lows occurred in wells in the Upper Potomac aquifer near Toana, Virginia (the second consecutive all-time low). Monthly lows occurred for the 11th consecutive month in the Sand and gravel aquifer well at Ensley, Florida, in the Sparta aquifer well near Ruston, Louisiana, and in the Memphis sand aquifer well near Memphis, Tennessee (following an all-time low last month).

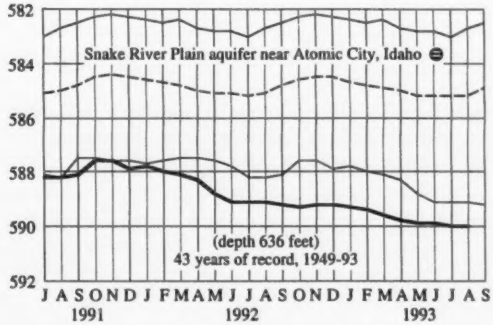
In the Southeast Coastal Plain region, levels were below last month's in Florida, mixed with respect to last month's in Georgia, and below average with respect to long-term average.

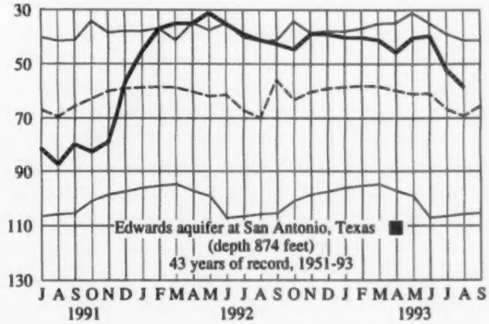
MONTHEND GROUND-WATER LEVELS IN SELECTED WELLS

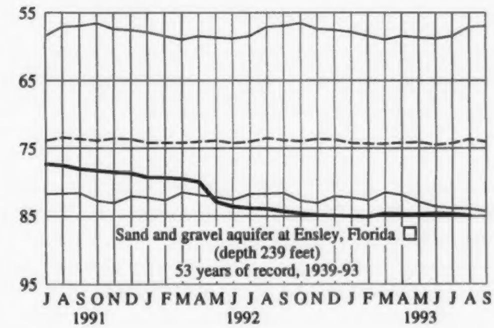
Area between light-weight solid lines indicates range between highest and lowest record for the month. Dashed line indicates average of monthly levels in previous years. Heavy line indicates level for current period.

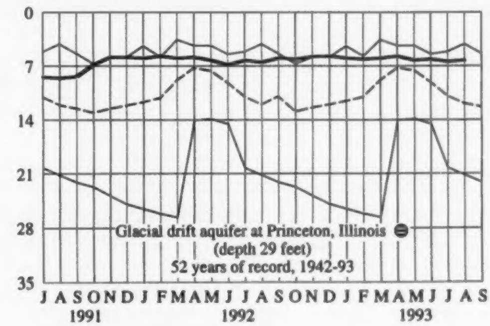
WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM

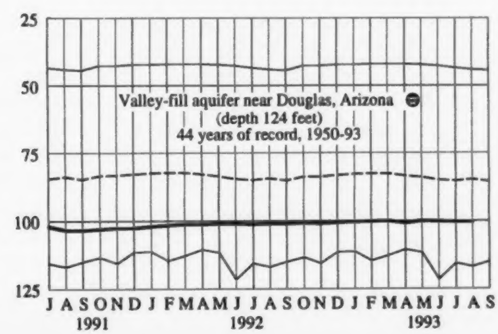


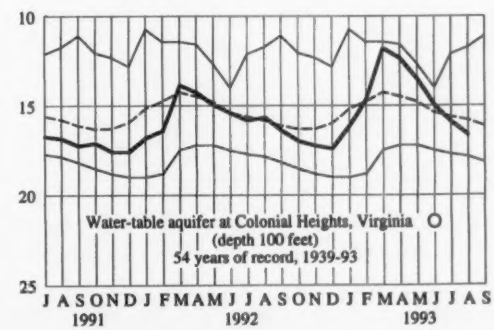




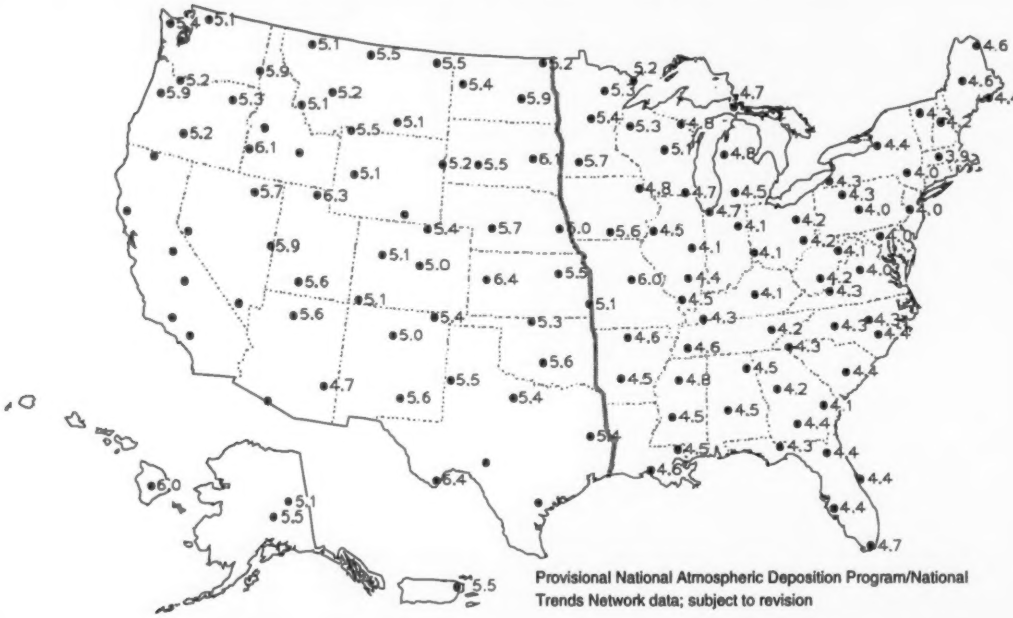








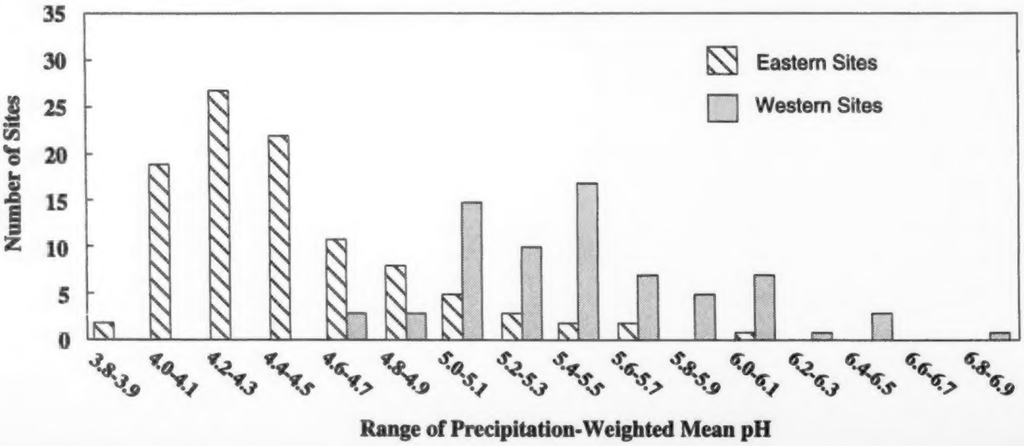
pH of Precipitation for July 26-August 22, 1993



Current pH data shown on the map (• 4.9) are precipitation-weighted means calculated from preliminary laboratory results provided by the NADP/NTN Central Analytical Laboratory at the Illinois State Water Survey and are subject to change. The 129 points (•) shown on this map represent a subset of all sites chosen to provide relatively even geographic spacing. Absence of a pH value at a site indicates either that there was no precipitation or that data for the site did not meet preliminary screening criteria for this provisional report.

A list of the approximately 200 sites comprising the total Network and additional data for the sites are available from the NADP/NTN Coordination Office, Natural Resource Ecology Laboratory, Colorado State University, Fort Collins, CO 80523.

Distribution of precipitation-weighted mean pH for all NADP/NTN sites having one or more weekly samples for July 26-August 22, 1993. The East/West dividing line is at the western borders of Minnesota, Iowa, Missouri, Arkansas, and Louisiana.



NATIONAL WATER CONDITIONS

AUGUST 1993

	Based on reports from the Canadian and U.S. Field offices; completed March 28, 1994
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Page showing pH of precipitation data furnished by Office of Atmospheric Deposition.

The *National Water Conditions* is published monthly. Subscriptions are free on application to the U.S. Geological Survey, 419 National Center, Reston, VA 22092.

EXPLANATION OF DATA (Revised March 1994)

Cover map shows generalized pattern of streamflow for the month based on provisional data from 186 index gaging stations—18 in Canada, 166 in the United States, and 2 in the Commonwealth of Puerto Rico. Alaska, Hawaii, and Puerto Rico inset maps show streamflow only at the index gaging stations that are located near the point shown by the arrows. Classifications on map are based on comparison of streamflow for the current month at each index station with the flow for the same month in the 30-year reference period, 1961-90. Shorter reference periods are used for one index station in Utah and both of the Puerto Rico index stations. Streamflow data presented herein are those published in the annual series of U.S. Geological Survey reports titled *Water Resources Data* (State) through the end of the 1992 water year—September 30, 1992. All other data are provisional.

The comparative data are obtained by ranking the 30 flows for each month of the reference period in order of decreasing magnitude—the highest flow is given a ranking of 1 and the lowest flow is given a ranking of 30. Quartiles (25-percent points) are computed by weighted averaging of the 7th and 8th highest flows (upper quartile), 15th and 16th highest flows (middle quartile or median), and the 23rd and 24th highest flows (lower quartile). The upper and lower quartiles set off the highest and lowest 25 percent of flows, respectively, for the reference period. The median (middle quartile) is the middle value by definition. For the reference period, 50 percent of the flows are greater than the median, 50 percent are less than the median, 50 percent are between the upper and lower quartiles (in the normal range), 25 percent are greater than the upper quartile (above normal), and 25 percent are less than the lower quartile (below normal). Flow for the current month is then classified as: in the ***above-normal range*** if it is greater than the upper quartile, in the ***normal range*** if it is between the upper and lower quartiles, and in the ***below-normal range*** if it is less than the lower quartile. Change in flow from the previous month to the current month is classified as ***seasonal*** if the change is in the same direction as the change in the median. If the change is in the opposite direction of the change in the median, the change is classified as ***contraseasonal***. For example: at a particular index station, the January median is greater than the December median; if flow for the current January increased from December (the previous month), the increase is seasonal; if flow for the current January decreased from December, the decrease is contraseasonal.

Flood frequency analyses define the relation of flood peak magnitude to probability of occurrence or recurrence interval. ***Probability of occurrence*** is the chance that a given flood magnitude will be exceeded in any one year. ***Recurrence interval*** is the reciprocal of probability of occurrence and is the average number of years between occurrences. For example, a flood having a probability of occurrence of 0.01 (1 percent) has a recurrence interval of 100 years. ***Recurrence intervals imply no regularity of occurrence***; a 100-year flood might be exceeded in consecutive years or it might not be exceeded in a 100-year period.

Statements about ***ground-water levels*** refer to conditions near the end of the month. The water level in each observation well is compared with average level for the end of the month determined from the entire period of record for that well. ***Changes in ground-water levels***, unless described otherwise, are from the end of the previous month to the end of the current month.

Dissolved solids and temperature data are given for three stream-sampling sites that are part of the National Stream Quality Accounting Network (NASQAN). ***Dissolved solids*** are minerals dissolved in water and usually consist predominately of silica and ions of calcium, magnesium, sodium, potassium, carbonate, bicarbonate, sulfate, chloride, and nitrate. ***Dissolved-solids discharge*** represents the total daily amount of dissolved minerals carried by the stream. ***Dissolved-solids concentrations*** are generally higher during periods of low streamflow, but the highest dissolved-solids discharges occur during periods of high streamflow because the total quantities of water, and therefore total load of dissolved minerals, are so much greater than at times of low flow.

FACTORS FOR CONVERTING INCH-POUND UNITS TO INTERNATIONAL SYSTEM UNITS (SI)

Multiply inch-pound units	By	To obtain SI units
	Length	
inches	2.54×10^{1}	millimeters (mm)
	2.54×10^{-2}	meters (m)
feet	3.048×10^{-1}	meters (m)
miles	1.609×10^{0}	kilometers (km)
	Area	
square miles	2.590×10^{0}	square kilometers (km^2)
	Volume	
acre-feet (acre-feet)	1.233×10^{-3}	cubic hectometers (hm^3)
	1.233×10^{-6}	cubic hectometers (km^3)
	Flow	
cubic feet per second (ft^3/s)	2.832×10^{-2}	cubic meters per second (m^3/s)

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